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we can acquire an insight into its constitution. We can determine magnitudes, distances and other properties of objects, and that is all that is needed.

Human reason exists as reason only in the human brain, but there are features in the objective world which make it possible that the theorems of reason assist us in comprehending the conditions of things. This objective counterpart of human reason has been characterized as the cosmic world order. The Germans call it *Gesetzmässigkeit*, a word which we have translated by "lawdom," meaning a state which admits of a description in so-called laws of nature. Mathematics more than any other science, helps us to understand this lawdom of the objective world, and although mathematical conceptions are purely mental, although there are no trigonometrical ideas, no sines nor cosines, no algebraic formulas extant in the objective world, the theorems of mathematics, being constructed in the field of anyness, help us to understand any analogous products; and also to render possible thereby a comprehension of this real world of ours.

#### ON THE MAGIC CIRCLE.

In the author's article on "Mediæval Occultism" (*The Monist*, XVIII, 510) a suggestion was made to the effect that the magic circle which forms an integral part of all thaumaturgic ritual served to define or limit the magical environment. Further consideration on this matter combined with a study of Buddhist and Chinese occultism has led the author to extend the use of this circle to a considerable extent.

It has long been recognized among anthropologists that temples as the residences of supernal powers represent in miniature the universe, and it is not difficult to show that the circle, with two perpendicular diameters oriented, is also a very widely used symbol for the universe, so that the magus operates as it were within a universe of his own creation. This then is the thesis of the present article, and it may be defined more generally as follows:

*"The magic circle is an essential feature of magical operations, and expresses symbolically the universe. Within this circle the magus by the processes of ritual evokes supernatural powers (as he conceives them to be) with a space relation to the corresponding positions in the physical universe and the ideal universe of occult philosophy."*

In order to prove this statement it will be necessary to show that there is some certain relation between the circle, the real universe and the ideal universe of the magicians.

That there is a relation between the circle and the real universe follows immediately from the orientation. This feature is essential to the construction of the magic circle<sup>1</sup> and the cardinal points were marked by censers, lines and magical texts. There is an immediate analogy in the orientation of the Gilgals or Cromlechs of the Stone Age (as instanced at Avebury, Stonehenge and Karnak), the Babylonian Ziggurats, the Egyptian and Greek temples and Catholic churches.

The next and more important link in the chain is the establishment of a space relation between the real and the ideal universes. In early times the ideal universe was necessarily indistinguishable from the real, so that in the Babylonian and Egyptian cosmogonies the gods or spirits have a definite space relationship. To put it somewhat crudely, they were more or less defined by spherical co-ordinates! As beliefs developed together with practical experience, the ideal universe became independent of the real but nevertheless coexistent with it in space and occupying much the same position as in the primitive scheme. The process would seem to be analogous to that by which we conceive a man's body being inhabited by an ideal soul which coincides more or less exactly with that body in its space relations.

It may seem somewhat superfluous to attempt here to prove this space relationship of the occult world, since so much research has already been done in this direction and the idea is of itself acceptable, but there is a further wish on the author's part not only to prove this but also to exhibit this proof in relation to the main question of the discussion, i. e., the magic circle.

In at least four distinct cases in ancient thought is there to be found a connection between the apparent rotation of the heavens about the earth and the psychical and physical conditions of man. Among the Egyptians<sup>2</sup> the soul of man is likened to the Sun which rises in the East as Ptah from the land of the shades (Amentet) culminates in the south as the omnipotent Ra, dies in the west as Osiris, and passing through the underworld, completes the cycle. The identity of the dead with Osiris in the "Book of the Dead" is

<sup>1</sup> See the *Clavicula Salomonis*, the *Grimorium verum*, or the *Pentameron* of Peter d'Abano on this point.

<sup>2</sup> Wallis Budge, *The Mummy, Guide to the First and Second Egyptian Rooms, British Museum*, and *The Gods of Egypt*.

even more complete than that of the Christian with Christ, and the Egyptian name of the book may be translated as "Coming forth as Horus" without philological violence. The ideal universe then corresponds to the ecliptic in the year or the hour-circle in the day, and the heavenly beings with whom man has to do are located along that circle. The meridian passes through the Elysian fields in the south (in north latitudes) and through the abode of Death in the north. In early times doubtless this idea would be accentuated by travelers' reports of the cold of the north and the tropical luxuriance of the south.

The second is that of China. In the third chapter of the *Chou Yih* (*Yih Ching*) are given the famous "Eight Trigrams of Fu-Hsi"<sup>3</sup> and also his diagrams of the Sixty-Four Kwa. Both diagrams are arranged *in a circle* with *Chien*, the uncombined Yang (male principle), in the south,<sup>4</sup> and *Kwun*, the uncombined Yin (female principle), in the north. The intermediate values of the *Kwa Yao* (combinations of the Yin and Yang in groups of six) occupy positions round the circle roughly corresponding to their contents of Yin or Yang, i. e., those mostly Yin are towards the north and those mostly Yang towards the south. Although there is no mention of a circular motion (the *Yih* or change being supposed in creation to have proceeded by ramification like the Darwinian genealogical tree) the use of these circles and the name of Tai Yang (Great Yang) which is colloquially given to the Sun would imply that the *Ch'i* (Breath of the Universe) sweeps round the circle however the elements of the circle may have been produced. It may be noticed here that the legendary history of the Egyptian gods also proceeds on lines of biogenesis so that the two systems are quite analogous.

The third is the Buddhistic Wheel of Life.<sup>5</sup> This represents the universe as an ever revolving wheel in the clutches of the Beast of Desire (a tortoise in the Tibeto-Chinese diagrams).<sup>6</sup> At the hub are the three symbolical animals representing Ignorance, Lust and Anger, and in the six panels of the wheel are the various conditions of the universe. At the left above the horizontal spoke we

<sup>3</sup> See Dr. Carus, "Chinese Occultism," *Monist*, XV, 500; 21st, 24th and 25th pages of the Chinese version.

<sup>4</sup> At the top of the diagrams because the Chinese compass points south.

<sup>5</sup> See Waddell's *Buddhism in Thibet*. There is description of it also in Rudyard Kipling's novel *Kim*.

<sup>6</sup> This beast would seem to resemble the tortoise on whose back Fu-Hsi discerns the diagrams. See also Dr. Carus on P'an Ku in the article above referred to.

have the Human World, above this Heaven (the culmination), then descent through the realms of the Demi-Gods to the two Hells, and finally through the realm of the Tormented Spirits back to the Human world. The twelve Nidanas or links in the chain of causality (psychical) surround the wheel and are regarded as the source of its motion. It is to be presumed that the wheel revolves with regard to the man, or else we must consider the wheel as stationary and the soul revolving in it. Here again we have a solar analogy since the soul is born into human life on the horizontal line (the horizon), rises to the gods (in the zenith, or meridian altitude), dies on the horizon (corresponding to the west), descends to the hells (in the Nadir or meridian depression) and comes back to earth again. There may perhaps be some analogy in the traditional descent of Christ into hell whence he ascended to earth, and then to heaven.

The fourth is the astrological scheme. The *Schema Coeli* or figure of the heavens (commonly called the horoscope, i. e., a view of the heavens at a certain hour) is certainly very ancient. It is, the author believes, referred to in Ptolemy's *Tetrabiblos* and may possibly be derived from Egyptian astronomy.<sup>7</sup> Until recent years a square form was used for the table, but Lieutenant Morrison ("Zadkiel") introduced a circular form which more nearly corresponds to the astronomical measurements employed.

The astrologers divide the celestial sphere into twelve equal lunes which are defined by a series of twelve equal sectors on the prime vertical, the eastern horizontal being used as the origin and the angles measured anti-clockwise looking south (i. e., reverse to the earth's rotation and in the same direction as the motion of the planets in the ecliptic). These lunes are called the Houses, and each is given by the astrologers a particular relation to temporal affairs which are influenced correspondingly when the planets are situated therein. The ascendent or first house (just below the eastern horizon) is called that of Life, and the seventh (just above the western horizon), that of death. The fourth house (next to the meridian) is associated with the highest honors, and the opposite one, the tenth (next to the meridian below the horizon), with misfortunes. Here there is a perfect analogy between the motions of the celestial bodies and the ideal universe of man, and the grounds for the beliefs of the astrologers are identical with those for all forms of sympathetic

<sup>7</sup> See a very ingenious speculation of the late R. A. Proctor as to the astronomical use of the Great Pyramid in an early volume of *Knowledge*.

magic. The mediæval sorcerers undoubtedly drew much of their ritual from astrological sources, although the use of circles is not necessarily derived directly therefrom.<sup>8</sup>

These references should suffice to establish the connection between the oriented circle and the universe, and it only remains to show that the circle was knowingly employed in this sense, to completely prove the thesis.

In the text-books of mediæval magic there will frequently be found instructions to invoke from each quarter of the compass, or again to call certain spirits from a given direction. Such rules occur in the *Clavicula*, but in the absence of references the author cannot recollect the locus, nor can he give the names of other books although such instructions certainly appear in them.

The practice of the "eastward position" in churches, however, is alone sufficient to show that there is a traditional association of ideas of the kind sought. The practice of ceremonial processions with the Sun, such as is frequently to be observed in Catholic services, is an additional demonstration. If, however, we proceed further we shall only be retracing the ground which has been already covered by students of heliolatry.

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#### NOTES ON PANDIAGONAL AND ASSOCIATED MAGIC SQUARES.

The reader's attention is invited to the plan of a magic square of the thirteenth order shown in Fig. 1 which is original with the writer. It is composed of four magic squares of the fourth order, two of the fifth order, two of the seventh order, two of the ninth order, one of the eleventh order and finally the total square of the thirteenth order, thus making twelve perfect magics in one, several of which have cell numbers in common with each other.

To construct this square it became necessary to take the arithmetical series 1, 2, 3... 169 and resolve it into different series capable of making the sub-squares. A close study of the constitution of all these squares became a prerequisite, and the following observations are in a large part the fruit of the effort to accomplish the square shown. This article is intended however to cover more particularly the constitution of squares of the fifth

<sup>8</sup> Note a mention of magic circles in Cicero, *De Divinatione*.